# Fly Through A Pig's Heart

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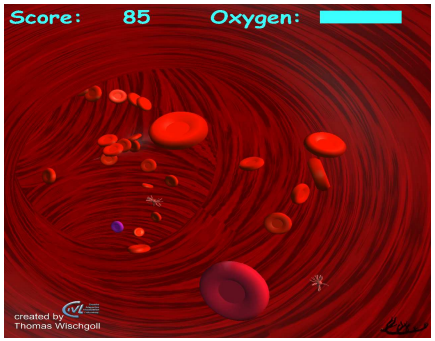



This exhibit enables you to go on a fantastic voyage through the blood stream. Based on a scan of a real pig's heart the arterial blood vessels were modeled allowing you to navigate through the vascular system of this heart and explore the blood and its different particles.

## What is there to do in this exhibit?

This exhibit simulates a submarine inside the blood vessels of a pig. Your task as a commander of this submarine is to steer through the blood stream. In order to be able to breath you need oxygen which you can gather from the red blood cells within the blood stream. Oxygen transfer occurs by just touching a red blood cell. Your submarine has a relatively weak hull which makes you loose oxygen when colliding with the vessel walls. As a submarine, the body recognizes you as a foreign substance, thus leading to a immune response by the white blood cells. Do not get in touch with this type of cell; otherwise these cells will try to remove you from the blood stream increasing your stress level and hence your oxygen consumption. Points are awarded based on how much oxygen you can collect. Your current point score and oxygen level is displayed at the top. Once you used all your oxygen before collecting some more the game is over.

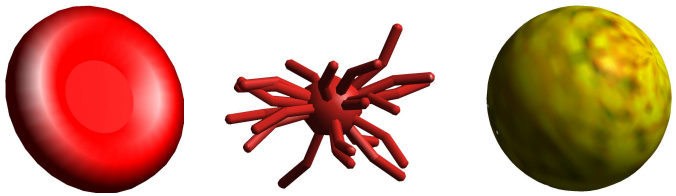
## Steering controls

You can navigate using the game controller. To begin your tour, press the start button on top of the controller. Only the two joysticks are needed for steering. By pushing the left joystick forward or backward, the submarine submarine speeds up or slows down respectively. Using the right joystick changes the direction of the submarine to the left, right, up or down.

## What Is Blood and What Does It Do?

Two types of blood vessels carry blood throughout our bodies: The arteries carry oxygenated blood (blood that has received oxygen from the lungs) from the heart to the rest of the body. The blood then travels through the veins back to the heart and lungs, where it receives more oxygen. As the heart beats, you can feel blood traveling through the body at your pulse points - like the neck and the wrist - where large, blood-filled arteries run close to the surface of the skin.

The blood that flows through this network of veins and arteries is called whole blood. **Whole blood** contains three types of blood cells, including:



Red blood cell Platelet White blood cell

These three types of blood cells are mostly manufactured in the bone marrow (the soft tissue inside our bones), especially in the bone marrow of the vertebrae (the bones that make up the spine), ribs, pelvis, skull, and sternum (breastbone). These cells travel through the circulatory system suspended in a yellowish fluid called **plasma** (pronounced: **plaz**-muh). Plasma is 90% water and contains nutrients, proteins, hormones, and waste products.

Whole blood is a mixture of blood cellsand plasma.

Red blood cells (also called **erythrocytes**, pronounced: ih-**rith**-ruh-sytes) are shaped like slightly indented, flattened disks. Red blood cells contain an iron-rich protein called **hemoglobin** (pronounced: **hee**-muh-glow-bun). Blood gets its bright red color when hemoglobin in red blood cells picks up oxygen in the lungs. As the blood travels through the body, the hemoglobin releases oxygen to the tissues. The body contains more red blood cells than any other type of cell, and each red blood cell has a life span of about 4 months. Each day, the body produces new red blood cells to replace those that die or are lost from the body.

White blood cells (also called **leukocytes**, pronounced: **loo**-kuh-sytes) are a key part of the body's system for defending itself against infection. They can move in and out of the bloodstream to reach affected tissues. The blood contains far fewer white blood cells than red cells, although the body can increase production of white blood cells to fight infection. There are several types of white blood cells, and their life spans vary from a few days to months. New cells are constantly being formed in the bone marrow.

Platelets (also called **thrombocytes**, pronounced: **throm**-buh-sytes) are tiny oval-shaped cells made in the bone marrow. They help in the clotting process. When a blood vessel breaks, platelets gather in the area and help seal off the leak. Platelets survive only about 9 days in the bloodstream and are constantly being replaced by new cells. Blood also contains important proteins called **clotting factors**, which are critical to the clotting process. Although platelets alone can plug small blood vessel leaks and temporarily stop or slow bleeding, the action of clotting factors is needed to produce a strong, stable clot. Platelets and clotting factors work together to form solid lumps to seal leaks, wounds, cuts, and scratches and to prevent bleeding inside and on the surfaces of our bodies.